independent determinations by the representatives of both governments. This was not practicable in the longitude determinations, but in the latitudes, running the parallels and locations of the numerous monuments, it was strictly carried out. The mean difference in the location of the 258 monuments, was less than three-tenths of a metre; the maximum difference was only 1.8 m., which occurred in locating a point about midway between two old monuments 100 miles apart, and over a very rough mountainous country, where the distances between water holes was over 60 miles. The angular variations of the lines run by the two parties at this point was a little more than three seconds.

The final results from the astronomical observations were required for immediate use on the ground; to permit the computations the mean declinations for the stars for latitude had been furnished by Professor T. H. Safford, of Amherst. In this way the latitude and azimuth were always available within three or four days after the observations were completed, a feature of such work that, it is believed, has not heretofore been attempted. Mr. Mosman promises that a list of the stars furnished by Professor Safford, some 600, will be published in the report of the commission, to be available for future work in the same latitude.

In locating the intermediate monuments the commission made use of the stadia, with gratifying results. On the parallel of 31° 47′ for a distance of 100 miles both chain and stadia were used for the purpose of comparison. It was found that the stadia was much more reliable than the chain, even on the desert, and in a rough country was much superior. The whole line was measured by both the American and Mexican engineers independently; when the two results for any distance differed more than one part in 500, remeasurements were made by steel tape or triangulation to discover the error. Many lines determined by triangulation were compared with the lengths determined by stadia, and the results showed that the stadia measurement could be relied on within one part in 1000. One line of 45 miles measured over rolling sand hills differed by one part in 1800 only.

In addition to the astronomical work, a strip of topography was surveyed on the American side 2½ miles wide, and a line of levels was run with the wye level from the Rio Grande to San Diego, giving the elevation of each monument above mean tide of the Pacific Ocean. The levels were checked at Yuma with R. R. levels from San Francisco, showing the infinitismal discrepancy of two hundredths of a metre, probably an accident. At the Rio Grande there is a discrepancy of about two metres, but the datum plane for the R. R. levels at this place is not known. O.

THE NATURE OF SCIENCE AND ITS RELATION TO PHILOSOPHY.

If any one should ask me, 'What is physics?' I would tell him to study in the physical laboratory for ten years and then what he had learned by the time he was through would be the nearest he could get to an answer to the question. So to the question, 'What is science?' I can give no other general answer than that to anyone it is just what he knows about it. I can, however, give as a particular answer what I have in my own experience found science to be.

Science consists of weighing evidence and stamping each statement with an index of its reliability. That the sun moves around the earth is, according to the evidence at present produced, a statement with a reliability of 0. That the earth moves around the sun, we at the present day stamp as certain. That Mars contains living beings is to-day stamped as quite improbable. On the scale of probability where 0 means

not at all probable, and 1 means secure, $\frac{1}{2}$ means indifferent, we might say that such a statement regarding Mars would have a probability perhaps of $\frac{1}{25}$.

The difference between the unscientific and the scientific mind lies in the extent of evidence. The woman who lately left a fund for a prize to the one who shall establish communication with Mars had gathered enough evidence to give, in her mind, a high degree of probability to the supposition of the possibility of such an undertaking. And yet the members of the French Academy who accepted the money in the sense that it should go to the one making the best contribution to our knowledge of Mars were evidently in possession of enough further evidence to attach a very small degree of probability to the supposition.

This is the actual work of all the sciences. We cannot and dare not make statements except just so far as warranted by the facts. If you say that the act of discrimination increases the time of thought, the psychologist must answer yes, with a high degree of probability, because carefully collected experimental evidence points that way. If you say that consciousness is continuous during sleep, the psychologist must answer that reliable evidence is lacking, and that he is entitled to no opinion either way.

We often hear, from philosophers of the old school, the statement that the facts of the universe are divided into classes, each of which is given over to a science for investigation regarding details, while the general conclusions are reserved for the philosophers.

I must object to the limitation of science to the investigation of individual facts. Many of the problems with which a scientist is most directly concerned are the most general of all. The subject of time is one to which the psychologist and the astronomer devote their special attention. There can hardly be anything more general than the great independent variable, as it is called. Likewise space forms a problem for geometry, physics and psychology.

As every scientist knows, an investigator in one science is forced to learn a dozen other sciences; the more he specializes, the more remotely must he go for his information. For example, the specialist in experimental psychology is obliged to be more or less familiar with the science of measurement, with the astronomical determination of time, with portions of meteorology, with physics, with portions of organic chemistry and physical chemistry, with statistics, ethics, anthropology, etc., etc. The mediæval philosopher likes to bottle things up and label them, but the modern sciences are too lively specimens for that process.

This brings me to the question of the relation of science to philosophy. According to Wundt the work of philosophy is to take up and discuss the most general questions, time, space, number, etc., which cannot be handled by the particular sciences.

But let us consider a moment. Suppose the U. S. Government wishes a report on Lake Tahoe. It would go to the geographer to learn where it is, to the U. S. Survey to learn its measurements, to the chemist to know its composition, to the meteorologist to inquire about its weather, to the land owners for the price of land, to the boatman to learn the sailing qualities, etc., etc. It would print the reports all side by side for each reader to assimilate as he would or could. What it would not do would be to send out a special agent who should look into these matters himself and make his own report. We very well know that such agents filter through more of themselves than of the facts; they see what they bring eyes to see, and no one can be master of a dozen sciences or trades.

Suppose, however, it is desired to have a

treatment of the subject of 'time.' Wundt would propose that a special agent, called a philosopher, should gather up all he can from everybody and should present it as he thinks best. So with all the other fundamental questions. The result is that we have as many systems of philosophy as we have writers. Would it not be better to get the astronomer to present his experience with time, then the physicist to present his, then the psychologist, and so on? The reader can then assimilate what he is able, instead of accepting it as previously assimilated by the philosopher, as a kind of 'predigested' food.

A somewhat similar thought was spoken by Paulsen some years ago. I do not know if he has stated it in print. He considered that the day of philosophical systems was past; there could be text-books of philosophy as well as text-books of all sorts of things, but philosophy itself would consist of monographs by specialists.

Of course, on such conditions as these, we should be obliged to conclude that philosophy has no relation to the sciences and that, having the astronomer, the mathematician, the physicist, the geologist, the psychologist, the economist and all the others, we can entirely dispense with the philosopher.

E. W. Scripture.

Yale University.

'SCIENCE.'

[The following article, contributed by one of the original supporters of Science, will prove of interest to those who are not acquainted with the earlier history of the journal. All men of science are under very great obligations to Mr. Bell and Mr. Hubbard for establishing a weekly journal of science in America at a time when the conditions were less favorable than at present; to Mr. Scudder for the high standard maintained during his editorship, and to Mr. Hodges for his faithful and untiring efforts on behalf of the journal.

J. McK. C.]

In 1882 Mr. A. Graham Bell conceived the idea of establishing a scientific journal, which should do for America what 'Nature' does for England. For this purpose, he was willing to contribute, with the coöperation of Mr. Gardiner G. Hubbard, the sum of twenty-five thousand dollars, which, in the estimation of good judges, would be sufficient to start a weekly paper and put it on a paying basis. Mr. Bell furnished the larger proportion of this sum. Mr. Samuel H. Scudder, of Cambridge, Mass., became the editor. President Gilman, of Johns Hopkins; Major Powell, of the Geological Survey; Professor Newcomb, of the Nautical Almanac; Professor O. C. Marsh, of New Haven; and Professor Trowbridge, of Columbia College, agreed to give their advice, and to act with Messrs. Bell, Hubbard and Scudder as a Board of Directors. This board, representing different interests and localities, possessed great weight with the entire community, and was believed to be generally acceptable to scientists.

The first number of 'Science' appeared February 9, 1883, some six or eight months subsequent to the conception of the idea. Mr. Moses King, the first publisher, retired the succeeding September. Shortly after, Mr. C. L. Condit, formerly with the 'Nation,' took charge of the publishing department and continued until the spring of 1886. Mr. Scudder retired from the editorship in 1885 and was succeeded by Mr. N. D. C. Hodges, when the office was removed from Cambridge to New York. It was soon found that twenty-five thousand dollars was not sufficient, and Messrs. Bell and Hubbard continued to advance further sums until, in 1886, they had expended about seventy-five thousand dollars, without having made the paper self-supporting.

An arrangement was then made with Mr.